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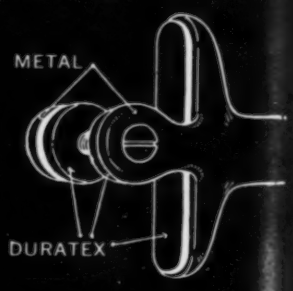

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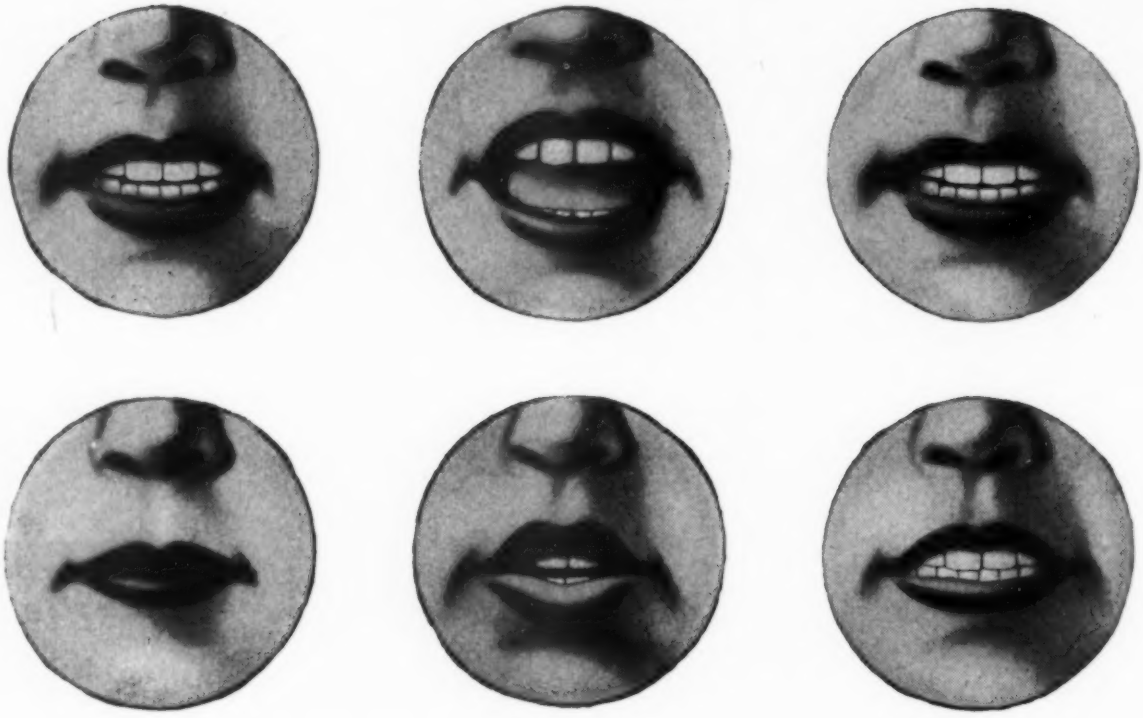

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The papers and reports are original and are accepted only with the understanding that they are to be published in this journal exclusively.

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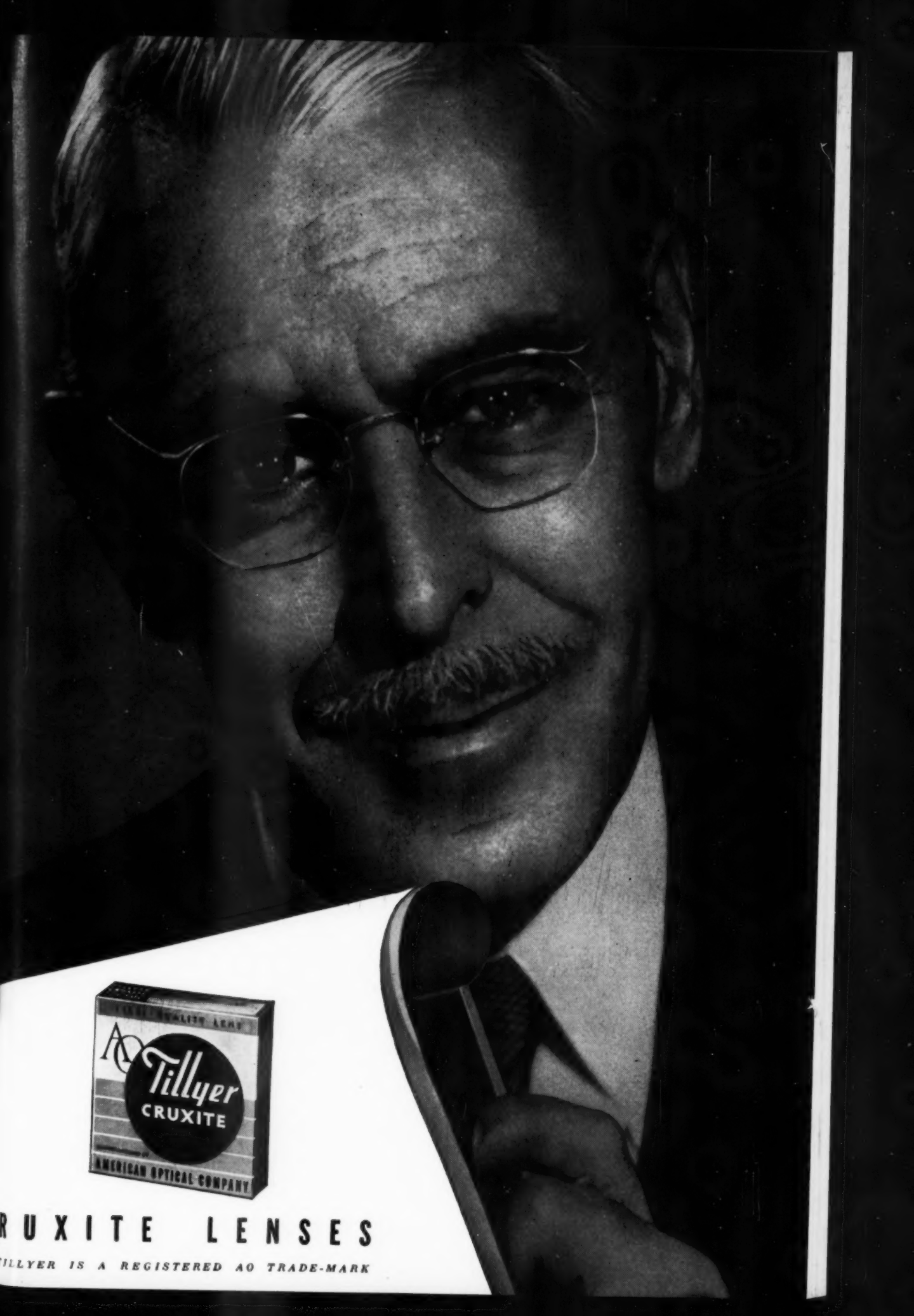

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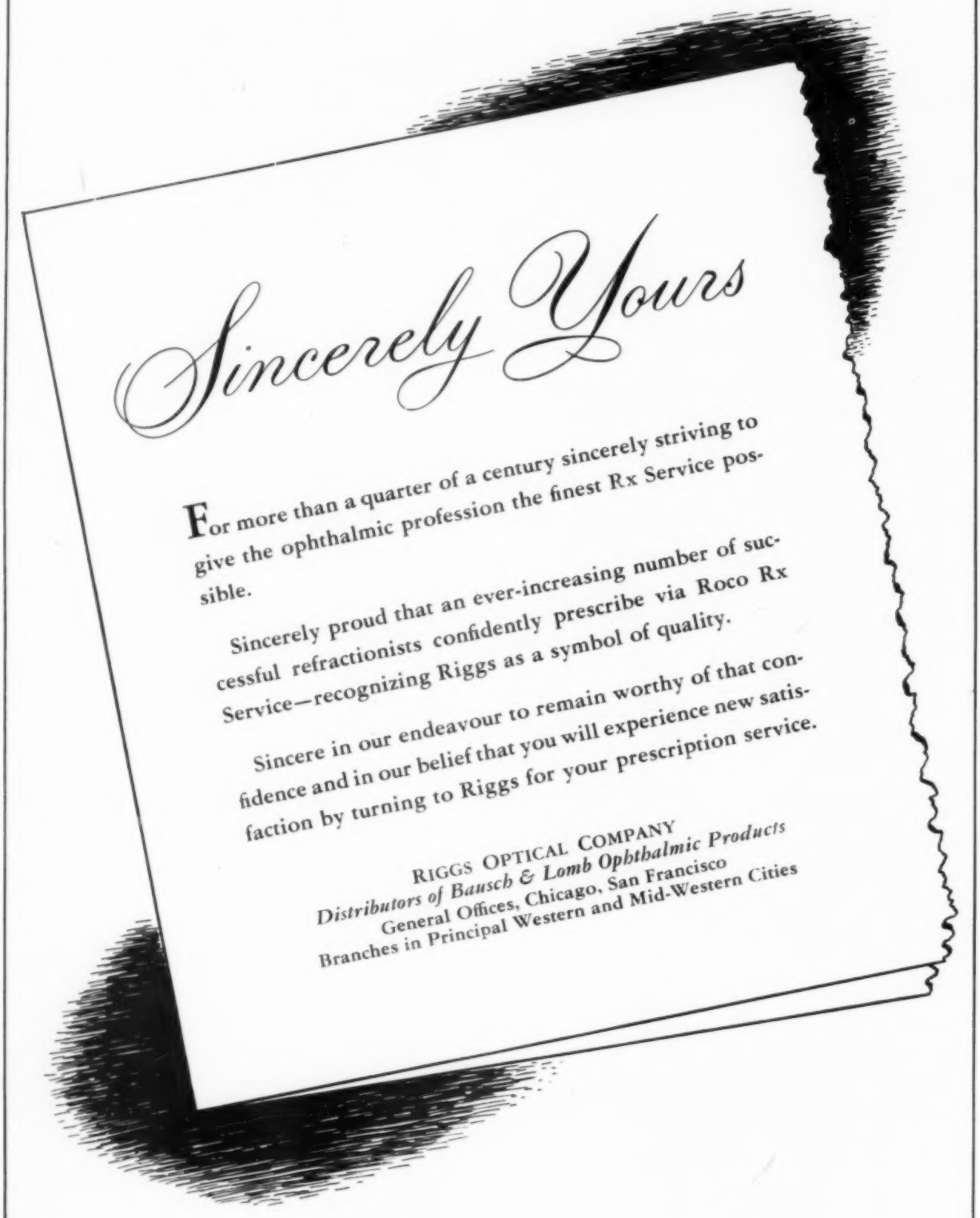
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Vol. 22 May, 1945 No. 5

DEPTH PERCEPTION IN RELATION TO VARIATIONS IN VISIBILITY*

Robert S. Jordan, O.D., F.A.O.A.
Cleveland, Ohio

The present experiment is an investigation of the effectivity of one of the factors involved in depth perception—namely, visibility. In this respect, it represents an extension of the work described by R. M. Hall in "Theoretical and Practical Considerations of the Pulfrich Phenomenon."[1]

Under normal conditions, the ability of an individual to perceive depth is dependent upon a number of factors: physical, physiological and psychological. The clues may be monocular or binocular and may be of different weight depending upon the individual and the circumstances. For our purposes, we have attempted to isolate, as nearly as possible, all other factors from the one under investigation.

The evaluation has been based upon a study of the effect upon depth perception of several situations of controlled visibility when this factor is varied independently for each eye. The role of ocular dominancy has also been taken into consideration.

APPARATUS

The standard Howard-Dolman test was used for all measurements of depth perception. The peg test was selected because it eliminates or decreases the effectiveness of certain psychological factors and monocular clues that may be found in other clinical tests.

The Luckiesh-Moss Visibility Meter with target was used in all relative visibility measurements.

Two diffusing lenses were used to reduce visibility. These lenses

* An abridgment of the material presented before the American Academy of Optometry at Chicago, Illinois, December 11, 1944. For publication in the May, 1945, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

[1] Am. Journal of Optom., Feb., 1938.

are designated as No. 6 and No. 4 of lesser and greater diffusing properties respectively.

The illumination on the targets for measuring relative visibility and depth perception was kept constant at 20 foot candles.

Test distances were constant at 20 feet.

PROCEDURE

Laboratory measurements were made in the following situations:

For depth perception—20 trials in first situation, 5 trials for all others.

1. Using no auxiliary lenses.
2. No. 6 diffusing lens before the right eye and no auxiliary lens before the other eye.
3. No. 6 diffusing lens before the left eye and no auxiliary lens before the other eye.
4. No. 4 diffusing lens before the right eye and no auxiliary lens before the other eye.
5. No. 4 diffusing lens before the left eye and no auxiliary lens before the other eye.

For relative visibility—5 trials for each situation.

1. Using no auxiliary lenses.
   a. Binocular rating.
   b. Monocular rating for each eye.
2. Using the No. 6 diffusing lens.
   a. Binocular rating.
      1. With diffusing lens before the right eye and no auxiliary lens before the other eye.
      2. With diffusing lens before the left eye and no auxiliary lens before the other eye.
   b. Monocular rating for each eye.
3. Using the No. 4 diffusing lens.
   a. Binocular rating.
      1. With diffusing lens before the right eye and no auxiliary lens before the other eye.

2. With diffusing lens before the left eye and no auxiliary lens before the other eye.

b. Monocular rating for each eye.

To maintain experimental constancy, the following technique was used:

1. Twenty depth perception readings with no auxiliary lenses. (Fatigue test.)
2. Fifteen minute rest period. (Minimum.)
3. Remaining depth perception tests with diffusing lenses.
4. Fifteen minute rest period. (Minimum.)
5. All relative visibility findings.

The testing of each subject was completed in one session.

Twenty-seven laboratory periods were arranged for a group of twenty-five subjects, six were rejected for failing to attain a minimum level of stereopsis, two were run twice; while the remaining seventeen were subjects in just one session each. See charts on pages 204 and 205.

ANALYTIC SUMMARY

1. Relative visibility of the dominant eye to the non-dominant eye in twenty-one subjects—

greater	*less*	*equal* (± .5 unit)
7	4	10

2. The effect upon depth perception of decreasing the relative visibility of one tye independently of the other—

a. When the relative visibility of the dominant eye is decreased—

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	1	10	10
No. 4	1	14	6

b. When the relative visibility of the non-dominant eye is decreased

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	3	10	8
No. 4	7	9	5

Subject	Dominant Eye	Diffusing Lens	Relative Vis. (O.U.) Diffusing Lens Over Eye Indicated (R.V. Units)		Diffusing Lens Over O.S.				Diffusing Lens Over O.D.			
					Relative Vis. Comparison Between Two Eyes (R.V. Units)		Stereopsis Deviation From Zero (mm)		Relative Vis. Comparison Between Two Eyes (R.V. Units)		Stereopsis Deviation From Zero (mm)	
			R	L	R	L	5 Trials	20 Trials	R	L		
JEF	R	None	3.96	3.96	2.56	3.12	9.8	7.1	2.56	3.12	9.8	
		No. 6	4.84	4.02	2.56	2.96	7.0		2.56	3.12	9.0	
		No. 4	4.28	3.0	2.56	1.94	5.20		1.59	3.12	17.6	
PG	L	None	5.30	5.30	3.9	3.3	11.8	13.4	3.9	3.3	11.8	
		No. 6	4.16	2.98	3.9	2.64	14.8		2.88	3.3	33.0	
		No. 4	3.74	3.6	3.9	1.75	19.6		1.6	3.3	8.0	
RMH	L	None	8.89	8.89	4.32	6.18	6.2	6.4	4.32	6.18	6.2	
		No. 6	10.28	9.04	4.32	5.24	12.0		3.72	6.18	15.6	
		No. 4	7.74	6.36	4.32	2.6	17.8		2.5	6.18	16.2	
DGH	R	None	3.55	3.55	2.15	1.62	6.4	6.95	2.15	1.62	6.4	
		No. 6	3.48	3.32	2.15	1.47	15.1		1.65	1.62	11.4	
		No. 4	2.88	3.06	2.15	1.42	10.0		1.28	1.62	8.4	
ELH	L	None	9.06	9.06	3.96	4.16	5.4	4.2	3.96	4.16	5.4	
		No. 6	6.80	6.64	3.96	2.92	6.80		3.04	4.16	10.60	
		No. 4	5.26	4.90	3.96	1.90	9.20		2.34	4.16	9.0	
RSJ	R	None	5.82	5.82	4.28	4.22	4.0	7.2	4.28	4.22	4.0	
		No. 6	5.14	4.82	4.28	4.1	8.4		3.5	4.22	19.8	
		No. 4	4.54	4.32	4.28	2.90	18.6		2.06	4.22	18.6	
RSJ	R	None	3.0	3.0	2.6	2.9	6.2	10.9	2.6	2.9	6.2	
		No. 6	3.18	3.33	2.6	2.65	15.4		2.55	2.9	13.2	
		No. 4	3.50	2.89	2.6	1.85	11.2		1.68	2.9	4.8	
DGH	R	None	3.17	3.17	2.2	1.78	14.4	21.2	2.2	1.78	14.4	
		No. 6	3.45	3.5	2.2	1.56	32.0		1.81	1.78	5.0	
		No. 4	2.96	2.91	2.2	1.28	22.2		1.54	1.78	6.4	
RAH	R	None	8.3	8.3	4.1	4.04	9.0	7.9	4.1	4.04	9.0	
		No. 6	5.8	5.9	4.1	2.9	7.4		3.66	4.04	9.0	
		No. 4	5.9	5.5	4.1	2.28	5.6		2.2	4.04	8.6	
HK	R	None	6.2	6.2	5.86	3.96	12.6	12.5	5.86	3.96	12.6	
		No. 6	6.7	5.6	5.86	2.42	9.0		5.5	3.96	19.8	
		No. 4	4.4	5.44	5.86	2.64	4.4		3.56	3.96	20.4	

Subject	Dominant Eye	Diffusing Lens	Relative Vis. (O.U.) Diffusing Lens Over Eye Indicated (R.V. Units) R	L	Diffusing Lens Over O.S. Relative Vis. Comparison Between Two Eyes (R.V. Units) R	L	Stereopsis Deviation From Zero (mm) 5 Trials	20 Trials	Diffusing Lens Over O.D. Relative Vis. Comparison Between Two Eyes (R.V. Units) R	L	Stereopsis Deviation From Zero (mm)
AAS	R	None	10.0	10.0	6.1	7.2	4.2	6.1	6.1	7.2	4.2
		No. 6	9.0	7.7	6.1	7.0	8.2		4.1	7.2	6.6
		No. 4	8.3	6.65	6.1	2.96	5.6		2.76	7.2	7.8
AHW	R	None	2.94	2.94	2.5	1.65	7.0	8.4	2.5	1.65	7.0
		No. 6	2.4	3.6	2.5	1.51	8.2		1.79	1.65	4.2
		No. 4	2.07	3.06	2.5	.95	10.0		1.53	1.65	12.8
JDL	R	None	11.7	11.7	10.44	8.64	11.8	8.5	10.44	8.64	11.8
		No. 6	11.5	13.0	10.44	7.44	10.0		8.1	8.64	16.8
		No. 4	8.8	9.58	10.44	3.34	7.6		4.7	8.64	22.6
EK	R	None	8.28	8.28	5.22	5.32	5.0	5.65	5.22	5.32	5.0
		No. 6	8.92	8.94	5.22	8.04	7.0		5.8	5.32	5.4
		No. 4	8.28	6.3	5.22	3.84	4.8		3.22	5.32	10.6
AJR	L	None	3.34	3.34	2.28	2.68	18.2	29.4	2.28	2.68	18.2
		No. 6	2.05	2.48	2.28	2.3	29.6		1.9	2.68	12.4
		No. 4	1.89	1.87	2.28	1.32	44.2		1.22	2.68	26.4
BM	R	None	3.48	3.48	1.51	1.72	14.4	12.05	1.51	1.72	14.4
		No. 6	2.48	2.14	1.51	1.4	5.8		1.43	1.72	19.2
		No. 4	1.96	1.82	1.51	1.27	5.2		.93	1.72	22.8
RP (Alt.)	L	None	6.6	6.6	3.8	5.4	6.2	7.7	3.8	5.4	6.2
		No. 6	6.5	5.7	3.8	4.3	11.2		3.3	5.4	5.8
		No. 4	4.3	3.8	3.8	3.0	8.4		2.0	5.4	6.0
MMS	R	None	9.1	9.1	4.4	5.0	8.0	8.9	4.4	5.0	8.0
		No. 6	7.9	6.6	4.4	3.6	11.0		3.9	5.0	5.0
		No. 4	7.3	7.8	4.4	4.0	13.2		4.3	5.0	7.0
RS	R	None	5.48	5.48	4.92	3.64	9.4	14.4	4.92	3.64	9.4
		No. 6	4.38	3.16	4.92	2.36	12.4		3.44	3.64	8.4
		No. 4	1.74	2.4	4.92	1.15	6.2		1.84	3.64	12.8
RC	R	None	3.5	3.5	2.9	2.3	17.2	15.2	2.9	2.3	17.2
		No. 6	2.8	3.0	2.9	2.9	19.0		2.4	2.3	38.0
		No. 4	3.1	3.3	2.9	1.64	26.0		1.76	2.3	35.0
HG	L	None	6.5	6.5	3.3	3.5	15.4	19.9	3.3	3.5	15.4
		No. 6	2.7	2.5	3.3	1.9	19.4		1.9	3.5	23.8
		No. 4	2.1	1.9	3.3	1.3	13.4		.984	3.5	18.0

3. The effect upon depth perception of subjects having higher relative visibility with the dominant eye (7)—

   a. When the relative visibility of the dominant eye is decreased—

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	0	4	3
No. 4	0	6	1

   b. When the relative visibility of the non-dominant eye is decreased

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	1	2	4
No. 4	3	2	2

4. The effect upon depth perception of subjects having higher relative visibility with the non-dominant eye (4)—

   a. When the relative visibility of the dominant eye is decreased—

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	0	0	4
No. 4	0	3	1

   b. When the relative visibility of the non-dominant eye is decreased

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	0	2	2
No. 4	2	1	1

5. The effect upon depth perception of subjects having no significant difference between the relative visibility ratings of the two eyes (10)

   a. When the relative visibility of the dominant eye is decreased—

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	1	6	3
No. 4	1	5	4

   b. When the relative visibility of the non-dominant eye is decreased

diffusing lens	*increase*	*decrease*	*no change* (± 3mm)
No. 6	2	6	2
No. 4	2	6	2

TABLE
THE FIRST TEN AND LAST FIVE SUBJECTS
IN DEPTH PERCEPTION RATINGS
IN COMPARISON WITH THEIR RELATIVE VISIBILITY RATINGS

Subject	H.D. Rating	Binocular R.V.	Variations Between Monocular R.V.	Subject	H.D. Rating	Binocular R.V.	Variations Between Monocular R.V.
RSJ (No. 1)	1	..	1	DGH (No. 1)	8	..	8
AAS	2	2	..	AHW	9	(1)	2
EK	3	6	3	JEF	10	..	9
ELH	4	4	4	AJR	(1)	(4)	..
RMH	5	5	(3)	RC	(2)	(5)	..
RP	6	9	(4)	HG	(3)	(2)	..
RSJ (No. 2)	7	(2)	5	DGH (No. 2)	(4)	(3)	..
				HK	(5)	..	(1)

Numbers without parentheses indicate standing in order of high to low.
Numbers in parentheses indicate standing in order of low to high.
Dash indicates a rating in the group falling below the first ten and above the last five.

INTERPRETATION

In interpreting the experimental data, ± 3mm. variation in the peg test was considered within the range of no significant change. In visibility findings ± .5 unit was considered insignificant. These compared with samplings which showed the average deviation in all depth perception tests to be between ± 8 to ± 10mm., while the average deviation in visibility ratings approximates very closely the ± .5 unit selected. Because of the difference in the average deviation and the arbitrarily selected non-significant change of the depth perception findings, it is evident that the Howard-Dolman test is not sufficiently critical for experimental work. For this reason, the effects noted have been regarded only as tendencies because of this experimental limitation. It is the writer's belief, however, that these tendencies are pronounced and of sufficient significance to warrant a development in depth perception testing technique and a continued study of the subject matter of this experiment.

From the data just reviewed several observations may be made.

1. Depth perception ratings (without auxiliary lenses) are higher in those subjects having a close relationship between the relative visibility of the two eyes as well as higher binocular relative visibility. Among these, it may be seen that where the dominant eye has a slight preference in visibility the depth perception ratings are usually better.

2. Decreasing the visibility of one of the eyes did not always de-

crease the depth perception ratings, despite the fact that the established relationship between the two eyes had been altered and despite the fact that a fatigue factor was at work in the majority of cases with the tendency of reducing rather than improving these ratings.

3. Depth perception scores showed a tendency to improve with the addition of a diffusing lens over the dominant eye in cases where the relative visibility of the non-dominant eye was on a par or greater than the relative visibility of the other eye under normal visual conditions. Several instances were also recorded as improvements in depth perception when the change in visibility brought about by the diffusing lens was such as to more nearly equalize the relative visibility of the two eyes.

CONCLUSIONS

It has been concluded on the basis of the foregoing:

That there is a tendency for depth perception ratings to vary directly with binocular relative visibility ratings.

That there is a tendency for individuals having more nearly balanced visibility of the two eyes to have higher depth perception ratings.

That those individuals possessing slightly greater visibility in the dominant eye, tend to have higher depth perception ratings.

That some individuals may show rapid improvement in depth perception ratings when visibility is altered to the conditions just described.

DISCUSSION

DR. E. L. HIGGINS, CLEVELAND, OHIO. Many investigators have demonstrated the existence of various factors in the perception of depth. The significance of this paper lies in the fact that it establishes one factor, relative visibility, as playing an extensive role in depth perception. From the accumulated data we see that the difference in relative visibility between the two eyes, as well as the binocular relative visibility ratings, directly affect the ability of the individual to perceive depth.

I think it is well that the author, himself, pointed out the experimental failure of the peg test. This limitation should be sufficient in itself to disqualify any results being labeled "conclusive evidence." Further, the data showed that in a few instances a higher visibility rating was shown through a lens of greater diffusing properties.

Nevertheless, the over-all consistency in the findings and the importance of their indications should encourage further work in this field.

The first essential would be the development of a depth perception apparatus, sensitive enough, to show an average deviation acceptable for experimental purposes.

There are several intersting side-lights attached to this paper. First, in consideration of the failure of the peg test to show experimental dependency, we must view its wide use in many fields with some skepticism.

There were five instances, among 25 subjects, of a peculiar type of fatigue, noted in the 20 trials of depth perception taken without auxiliary lenses. Most of the findings showed a tendency toward poorer depth perception as the number of trials increased. The five findings in question, however, all showed an unusual type of stereoscopic failing. The pegs appeared as partitions dividing the aperture making depth perception impossible. One subject made this observation after only three trials, while still another subject did not notice this phenomena until after the sixteenth trial. It would be interesting to know the mechanism of this so-called fatigue, its incidence, and whether it is prevalent under other types of stereoscopic vision.

Also of interest, was the variation in relative visibility shown in several subjects who were given duplicate trials on different days. The author informed me that this difference was also found to exist in others specifically tested for that purpose. The differences were usually of small magnitude with little or no disturbance of the relationship of the visibility of each eye to the other.

Finally, I believe the results here add to the importance, not only of determining dominancy in the refractive routine, but also of adopting standard methods for making this determination.

ON ASTIGMATISM*

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PART III—SUBJECTIVE TESTS

Astigmatic Charts and Dials.
Cross Cylinder Test on Letters.
Astigmatism at the Near Point.
Stigmatoscopy.
Marquez and Biastigmatism.

The most incomplete subjective test is the method of the trial case and the letter chart, the technique which, like groping in the dark, employs the phrases "is this better—or is this worse?" The aim is solely to improve the patient's ability to read the Snellen chart; it is not a "measure" of the refractive condition but merely a trial-and-error method of determining what sphere, or what sphere and cylinder will enable the patient to read 20/20. There are some who believe that if the patient can read 20/20 the refractive error is corrected. It is not unusual to hear: "With this correction the patient could read 20/20 yet he still complains of discomfort." It should be common knowledge that it is possible for a person to read 20/20 and the refractive error to be under (or over) corrected by as much as two diopters. A young hyperope with ordinary accommodation can easily read 20/20 and still be two diopters undercorrected. A person having two diopters of astigmatism with-the-rule may read the 20/20 line of letters without a correction or with any correction from 0.25 to 2.00 D. cylinder. It should be obvious that the criterion of visual acuity alone is *not* a measure of the refractive error nor is it an indication of what part of the total ametropia has been corrected.

Astigmatism is a difference in the refraction between two principal meridians. Once one of these principal meridians has been determined, the crux of the test should be to find what is required to bring the other meridian to the same focus rather than what cylinder is required to enable the patient to read 20/20. In order to be legible, letters do not require the same focus in the vertical as in the horizontal meridian. This can be

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*This is the third of a series of four articles dealing with various clinical aspects of astigmatism. Presented before the twenty-first annual meeting of the American Academy of Optometry at Chicago, Ill., on December 10, 1944. For publication in the May, 1945, issue of the AMERICAN JOURNAL OF OPTOMETRY and ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

demonstrated by holding a —1.00 D. cylinder axis 90 (or a +1.00 D. cylinder axis 180) in front of an emmetropic eye or one rendered so by lenses, and noting that one is still able to read 20/20 despite the fact that there is introduced an astigmatic error of one diopter with-the-rule. If the —1.00 D. cylinder is held at axis 180 it is much more difficult, and often impossible to read the 20/20 line of letters. However, if this experiment is conducted not on letters but while viewing a distant chart consisting of a horizontal and a vertical black line the observer will immediately notice that the 1.00 D. cylinder causes first one line to be clearer and then the other as the cylinder is changed from axis 90 to 180.

Letters on the Snellen test card do not constitute a good test for astigmatism because the horizontal components of the letters require much less clearness for legibility than do the vertical components. In order to determine a refractive condition such as astigmatism, it is necessary to use a test chart designed to detect the nature of the error which we seek to measure; the astigmatic charts and dials fulfill this requirement.

ASTIGMATIC CHARTS AND DIALS

The best subjective methods of *measuring* astigmatism are the astigmatic charts and dials such as the clock chart, fan chart, T chart, Lancaster-Legan chart and dial, Verhoeff charts, Robinson-Cohen broken line projected dial, etc. The principle involved in all is similar: First fog the eye and determine which line is darkest or where is the center of the dark group (this designates the axis); then add cylindrical lenses to equalize all lines (this gives the amount).

We have found the Lancaster-Regan[65, 73] astimgatic chart (Fig. 2)

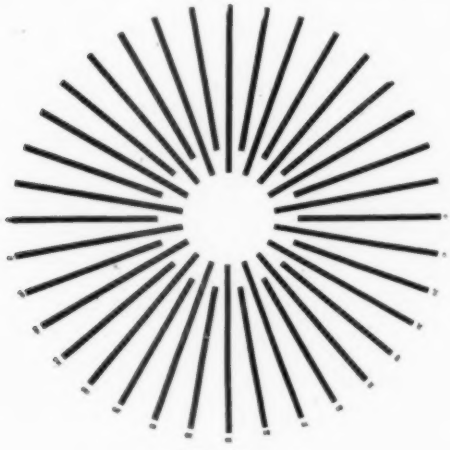

Fig. 2

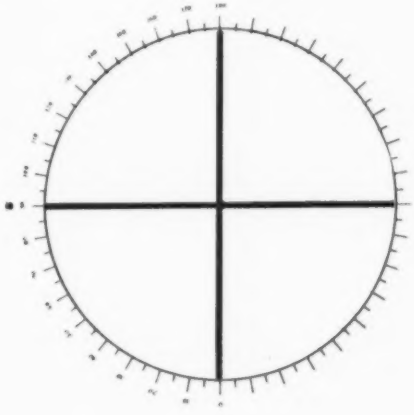

Fig. 3

and rotating dial (Fig. 3) very satisfactory. Our procedure is to consider the ophthalmometer readings, the static and dynamic retinoscopic findings and then to re-find the correction using the Lancaster-Regan chart and dial. Following the retinoscopic tests there is left in the trial frame or phoropter the sphere which *fully* corrects the most hyperopic (or less) myopic meridian. This sphere constitutes the proper fogging as it places the entire focal interval in front of the retina. The patient's gaze is then directed toward the astigmatic chart (Fig. 2), and one eye is occluded. The head should be erect and the trial frame or phoropter should be properly adjusted. The patient is asked to report which lines on the chart appear darker (or clearer). If there is no astigmatism he will report that all the lines appear equally clear. Using a ± 0.25 D. cross cylinder to check this answer, the minus axis is held first in the vertical position, then in the horizontal and finally in the oblique positions—axis 45 and 135. The patient with no astigmatism will report that first the vertical section of lines appear clearer, then the horizontal, and finally axis 45 and 135 as the cross cylinder axis is changed as directed above. Many patients will respond to a ± 0.12 D. cross cylinder and some observant patients will even recognize a ± 0.06 D. change.

When there is astigmatism the patient will report that a certain section of the lines stands out more clearly on the chart. The number of lines seen more clearly depends on the amount of astigmatism: the smaller the degree of astigmatism the greater the number of lines appearing dark, the higher the astigatism the fewer (more concentrated) will be the number of clear lines. Usually a group of five or three lines will make up the clear section and it is an easy matter to pick out the center of this dark group. When two or four or any even number of lines are clear the center of the group will, of course, be that place where an equal number of dark lines lie on either side. The place is indicated by the examiner, who holds a large pointer at the center of the dark group, midway between the lines selected by the patient. Once the mid-point of the clearer group has been determined, the cross (Fig. 3) is rotated to the meridians indicated by the first chart. Minus cylinders are inserted with the axis perpendicular to the line which appeared darkest until both lines appear equally clear.

Even if it was quite certain at the beginning of the test for astigmatism that the *full* retinoscopic finding corrected the more hyperopic or less myopic meridian, a check from time to time will make sure that the patient is properly fogged. This is accomplished by referring the patient to the letter chart and noting that he cannot read more than

20/20 and that an additional +0.50 D. sphere blurs his vision two lines (to 20/30). Once the two lines of the dial are equalized the correctness of the cylinder is checked by flipping the ±0.25 D. cross cylinder. The fog can be reduced 0.25 D. in order to enable the patient to detect small differences such as with ±0.12 D. cross cylinder. Care should also be taken during the examination to check that the patient's head is held erect because a tilting of the head will result in an improper selection of the axis of the astigmatism.

CROSS CYLINDER TEST ON LETTERS

Some prefer to use the cross cylinder technique on letters exclusively for the determination of the axis and amount of the cylinder. Cross cylinders are available in powers of 1.00 D., 0.50 D., 0.37 D., 0.25 D. and 0.12 D. They have the effect of a plus and a minus cylinder at right angles to each other. Cross cylinders can be obtained mounted on a ring with a handle placed midway between the two principal meridians at 45° from the axes of the two cylinders. By simply rotating the cross cylinder, the action of the cylinders is reversed, that is the convex axis assumes the position previously held by the concave axis.

The cross cylinder test on letters for the amount and axis of astigmatism is not done under fog. The theory is that the patient will chose the section of the astigmatic bundle which suits him best. In order to do so there must be some play in the accommodation permitting the patient to exert it or inhibit it as he sees fit. Some authors such as Crisp[74], believe that a slight fog should be used.

The cross cylinder test on letters consists in presenting to the patient a line of letters (preferably small) that he can read easily, flipping the cross cylinder in front of the eye and noting the position that the patient prefers, i.e., the one where he can read more letters. The proper spheres are in the trial frame and the cross cylinder is flipped in the 90° and 180°, and in the 45° and 135° meridians. The correcting cylinder is placed at the axis disclosed by the preferred position of the cross cylinder.

To refine a cylindrical correction it is best to determine the exact axis first and then the exact amount of the cylinder because the amount of cylinder required is dependent somewhat on the axis at which it is placed. The axis of the correcting cylinder, however, is not affected by the amount of cylinder. For the check on axis, some prefer even to increase the cylinder in the trial frame beyond the expected amount, claiming that it is easier to detect a small variation in axis for a high cylinder

than for a lower one. Quoting Edward Jackson [75] who originated the cross cylinder tests for the amount[28] and axis [29, 76] of the astigmatism:

> "How can I know if the axis of the cylinder in the trial frame is in the right direction?
>
> "Hold the cross cylinder before the eye with its handle in the direction of the axis of the cylinder in the trial frame. Rotate the cross cylinder, first one way, then the other. This changes the action of the combined cylinders, and shifts the axis of the combination first one way and then the other. Shift the axis of the trial frame cylinder toward the similar axis of the cross cylinder when it makes vision better. When the point has been reached at which the cross cylinder makes vision just as bad one way as the other, the axis of the cylinder in the trial frame is correct.
>
> "How can I find if the cylinder in the trial frame is of the right strength?
>
> "Use the cross cylinder before the eye with its handle at 45° with the axis of the cylinder in the trial frame. One axis of the cross cylinder will be parallel, the other at right angles to that of the trial frame cylinder. Rotate the cross cylinder. If one way is just as bad as the other, the cylinder in the trial frame is right for strength. If the vision is better when the similar axes are parallel, the cylinder in the trial frame needs to be made stronger. Or in other words, if it is worse when similar axes are parallel, the cylinder in the trial frame should be made weaker."

One explanation for the differences so commonly found between the determination of the astigmatic correction by means of the dial and by the cross cylinder is the different criteria utilized in the two methods. With the astigmatic charts and dials the patient is asked to judge between degrees of blackness (or grayness) while with the cross cylinder he is to judge how letters appear clearest (most legible). As has been stated so often, in the recognition of letters the vertical strokes are the most important, therefore patients will prefer a lens that will make the vertical strokes clearer, namely minus cylinders axis vertical. That is, with the cross cylinder test on letters, one is apt to obtain higher against-the-rule or lower with-the-rule findings. This factor may be avoided by using the round letters or the Landolt ring.

In contradistinction to Jackson and other advocates of the cross cylinder test on letters, Linksz[77] prefers to rotate the cylinder in the trial frame while the patient is viewing the Lancaster-Regan astigmatic chart. Linksz employs a method similar to that used by Lindner[43] in the Velano (streak) retinoscopy technique; that is, the rotation of the trial cylinder introduces various astimgatic differences, the character of which can be used as an accurate test for the refinement of the astigmatic correction.

Linksz maintains that the patient is able to report more accurately the result on the astigmatic chart of rotation of the trial cylinder than is possible by relying on successive comparisons of blur and distortion on a letter chart by the cross cylinder.

ASTIGMATISM AT THE NEAR POINT

Recently, we have been measuring the amount and axis of the astigmatism at the near point. A photographic reduction of the Lancaster-Regan astigmatic chart is held at 16″ (40 cm.) and the patient is instructed to select the darkest lines. The technique then consists of finding the cylinder which makes all the lines equally clear. As in the tests used for distance vision the near point tests may be supplemented by checking with the cross cylinders on the near point astigmatic chart or on letters. It has been found necessary to control the accommodation in most cases by increasing the plus sphere (or decreasing the minus sphere)—being guided by the findings of the Dynamic Cross Cylinder Test. This insures that the whole astigmatic bundle lies in front of the retina.

The attention that is being given currently to near point visual tests in industry, schools, and business emphasizes the need for the inclusion of astigmatic tests at the near point as well as for distance vision. While it is true that no one expects radical differences between the astigmatism for near as compared to distance nevertheless, the differences that do exist may be important in certain individual cases. We have found a tendency for the amount of astigmatism to be slightly more at the near point and this difference cannot always be explained by the change in effectivity of the lenses as the object distance is varied. Lancaster[78] in 1916 and Hughes[79] in 1941 described cases in which there were changes in the axis and amount of astigmatism on accommodation.

So far, we have not found that the axis of the astigmatism at near as compared to distance is different enough to warrant making any general statement at this time. Differences in the axis have been found but there has been no definite trend in these changes. Monocular tests at the near point with either the reduced astigmatic deal or with cross cylinders on letters have shown changes in axis position which have not been borne out by binocular tests at the near and far points. Binocular tests for astigmatism are made by the method of stigmatoscopy on the ophthalmo-eikonometer and also with a polaroid vectograph arrangement of on astigmatic chart. We plan to present a much more comprehensive paper on astigmatism at the near point in the early future.

STIGMATOSCOPY

The subjective method of refraction called stigmatoscopy consists of presenting to the subject a point source of light and determining the position where it is in best focus while the eye is unaccommodated. It will then be at the far point of the eye. In cases of hyperopia, it is advisable to render the eye myopic by the addition of plus lenses, in order that the far point be at a finite distance in front of the eye. In cases of astigmatism the point source will appear as a line or streak which will still be in best focus when at the far point of each principal meridian. The direction of the streak in these two positions is usually at right angles to each other. The distance between the two foci is the astigmatic interval and will correspond to the correction cylinder required. The slant of the streak from the horizontal or vertical will indicate the axis of the astigmatism. This method was originally used by Airy (1825) in determining the amount of astigmatism in his eye and it led him to determine the powers of the sphero-cylindrical lens that would correct it. It might be of interest to quote Airy's[7] own words on the matter:

> "I observe that the image formed by a bright point (as a distant lamp or star) in my left eye was not circular, as it is in the [right] eye . . . but elliptical, the major axis making an angle of about 35° with the vertical and its higher extremity being inclined to the right . . . [The] appearance indicated that the refraction of the eye was greater in the plane nearly vertical than in that at right angles to it and that consequently it would not be possible to see distinctly by the assistance of lenses with spherical surfaces . . .
>
> "My object now was to form a lens which should refract more powerfully the ways in one certain plane, than those in the plane at right angles to it: . . . for the facility of grinding . . . it appeared preferable to make one surface cylindrical, the other spherical; both concave . . .
>
> "To discover the necessary data, I made a very fine hole with the point of a needle in a blackened card, which I caused to slide on a graduated scale; then strongly illuminating a sheet of paper, and holding the card between it and the eye, I had a lucid point upon which I could make observations with great ease and exactness. Then resting the end of the scale upon the cheek bone, and sliding the card on the scale, I found that the point at the distance of 6″, appeared a very well defined line inclined to the vertical about 35° . . .: at the distance of 3½″ is appeared a very well defined line at right angles to the former . . . It was necessary, therefore, to make a lens, which, when parallel rays were incident should cause those in one plane to diverge from the distance of 3½″, and those in another plane from the distance of 6″ . . .
>
> "After some ineffectual applications to different workmen, I

at last procurred a lens to these dimensions from an artist named Fuller of Ipswich."

A modified method of stigmatoscopy was introduced by Ames and Gliddon[8] in 1928 and later incorporated into the ophthalmo-eikonometer. By means of two auxiliary lenses and a pair of half silvered mirrors inclined 45° about a vertical axis, a point source of monochromatic light originating on side arms at right angles to the patient's line (See

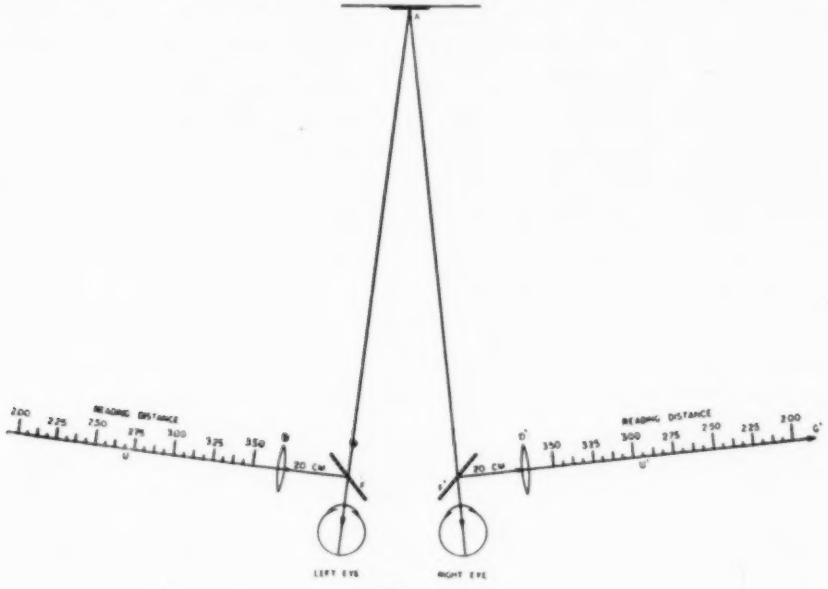

Fig. 4

Fig. 4). A minor displacement of the test object will cause a considerable displacement of the image. A scale on the arm is calibrated to read directly in refracting power: the dioptral equivalent of the distance. The proper lenses—spherical and cylindrical are inserted in cells in front of the patient's eyes to alter the focus and to bring the far point of the eye to the desired position. One advantage of this method of refraction is that it allows for the measurement of the conjugate focus of each retina while the eyes are being used binocularly, instead of with one eye occluded as is generally done.

MARQUEZ AND BIASTIGMATISM

Some prefer to use a combination of the objective and the subjective method. One of these methods which has attracted little attention in this country is that devised by Manuel Márquez[80, 81] and which we shall now summarize briefly:

Márquez emphasizes the need of correcting small amount of astigmatism. He explains that the total astigmia of the eye is the result of one, two or more astigmatic elements each one requiring a particular cylindrical correction. The eye, therefore, may be mono-astigmatic, biastigmatic, or polyastigmatic. He advocates the use of bicylindric combinations in determining the amount and axis of the astigmatism of an eye.

The procedure is to measure the corneal curvature with the keratometer and insert in the trial frame the cylinder to correct it at the axis obtained by the keratometer. The sperical component as determined by the retinoscope is placed in the trial frame also. Then the patient is shown the astigmatic dial and the residual astigmatism is determined in the usual way. The new cylinder correcting the residual astigmatism is inserted in the trial frame also, then we have in the trial frame a sphere and two cylinders usually at different axes.

Márquez claims that the advantage of introducing the cylinder to neutralize the corneal astigmatism lies in the fact that it is an unusual situation for which the eye is not accustomed to compensate, so small astigmatic errors will become evident. A further advantage claimed for the method is that a gradual series of intermediate cylindrical values can be obtained by crossing two cylinders obliquely which is not possible when using single cylinders of the trial case. Márquez has published a set of tables to translate the bicylindric combinations at oblique axes to the equivalent sphere and cylinder. The validity of the Márquez method has been presented in a recent article[82].

Every practitioner should have a number of subjective methods that he can use, though most patients probably will not require the use of all. Nevertheless, in every practice there are those difficult cases which require all the skill and patience of which the refractionist is capable. The chances of bringing relief to these patients are increased if the practitioner has at his command a large number of techniques which he can draw upon. It seems logical then, that the objective tests should precede and pave the way for the subjective tests. However, if one realizes the limitations of the objective tests, one must agree with Tscherning[49] that "the subjective examination . . . must always have the last word."

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SUGGESTED AIMS IN OPTOMETRIC EDUCATION*

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Civilized man differs from uncivilized man not only in status but also in purpose. Man in his primitive state has few needs and few desires other than of the most simple kind. Man in a state as complex as modern civilization must be constantly meeting new situations which present new problems, and with his highly developed mental and emotional nature, he is constantly desiring and striving for things beyond his grasp. In some respects he is involved in a "vicious circle" of desiring to invent new ways to satisfy new desires. As a result, he is compelled to define his aims and refine his methods in an ever increasing degree in his spiral-like progress.

The nature of aim in any activity implies purpose or motivated action on the part of the individual concerned. An aim is not an aim for an individual unless it is directly involved in the activity required for its achievement. An externally imposed aim can never mean purposeful activity on the part of the individual until it becomes the thing which he consciously strives to attain. There are certain important characteristics that determine the nature of aim. An aim implies that a definite and orderly procedure is planned which involves activities leading to a successful completion of a process. The aim also serves to give direction to activities by eliminating all extraneous or unrelated activities. For example, the aim of a traveler who wishes to go from New York to San Francisco determines the railroads or highways over which he will travel to reach his destination. His reason for going, the time at his disposal, the cost of transportation, and other factors involved in his aim play a large part in determining the selection of the activities to be included in his itinerary. The definite and orderly procedure in a given direction requires careful observation or study of existing conditions that may facilitate or handicap achievement of the aim. It requires, also, that the sequence of various activities shall be carefully determined. A well-defined aim makes economical selection and arrangement of stages of the journey possible. Finally, the aim makes possible the choice of

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alternatives as to route, side trips, and other features of the itinerary. As Dr. Dewey says: "The net conclusion is that acting with an aim is all one with acting intelligently."

Intelligent human beings are constantly setting up aims many of which are formulated quite unconsciously. Because of the part that aims play in determining the success or failure of the individual, it might be well to consider briefly the nature of good aims. In the first place, a good aim grows out of existing conditions. It is the result of a desire on the part of the individual to overcome some obstacle or to improve some undesirable condition. A New Year's resolution is typical of the aims frequently set up as a result of his attitude toward undesirable activities which the individual wishes to discontinue or of desirable activities which he wishes to initiate. Most aims emerge quite indefinitely, but as they continue to influence the individual's activities they become more definite. Aims should be flexible in order that they may be adapted to changing circumstances. One reason why so many New Year's resolutions fail is because they are inflexible and unsuited to the circumstances that arise. One of the most important characteristics of a good aim is that it represents a freeing of activities—activities definitely related to the achievement of the aim in view. This freeing of activities requires the elimination of all activities not related to the accomplishment of the purposes involved. By this means, distracting influences no longer interfere to prevent progress toward the goal ahead. For example, a student may formulate aims for study and preparation of university work which make it possible to free certain periods of the day or week for activities involved in the study of history. All other activities are eliminated while those related to the study of history are in progress. This careful definition or limitation of activities provides for greater freedom in the performance of them and a greater measure of accomplishment. Dr. Dewey says: "The only way in which we can define an activity is by putting before ourselves the objects in which it terminates—as one's aim in shooting is the target . . . Strictly speaking, not the target but hitting the target is the end in view . . . "

The nature of aims implies the necessity of aims. This is particularly true in any activity where definite achievement requires choice among several possible procedures. Effectiveness of results is determined largely by clearness of aim. This is true only with human beings. Lower animals act largely through instinct and rarely modify their natural modes of response, except in occasional instances, and even then the

results are frequently disastrous. The human being, endowed with a superior intelligence, is able to modify his responses in a multitude of ways. His response to a particular situation at a particular instant depends in large measure upon his understanding of the consequences. In other words, aims must have meaning to be useful, and their usefulness determines their necessity in guiding the activity of the individual.

Aims in education are of great significance, both to the individual and to society. It has already been shown how aims in education reflect the weaknesses and felt needs of people. It is because aims are stated largely in terms of needs that they are so important in education. As nations and other smaller social groups become conscious of weaknesses or as they develop new ideals and policies, sooner or later, these aspirations are reflected in the educational aims of the group. Whenever the needs are clearly felt and the prestige of the group is vitally concerned, the aims in education relate themselves most clearly and definitely to these needs. The militaristic education of Sparta was based upon the necessity for an army of strong men to protect the country from neighboring hostile nations. The imperial aspirations of later Rome demanded education suitable to the training of leaders who could serve in both military and civil affairs. When Prussia emerged from the Napoleonic wars with her prestige on the wane, the national leaders looked to the schools as a means of developing a strong national, militaristic spirit among the German people In recent years, particularly during the war period, many apparent weaknesses have been discovered in the American people. As a result, national leaders, statesmen, and educators have been busy formulating more definite aims in education. The same process has been at work among other groups such as the churches, the labor groups, various professional groups, and many other social and economic agencies. The recognition of a fundamental need almost always results in some modification in educational aims. Aims in education, to be useful, must be adapted to needs as they change, and needs are constantly changing. A fixed aim, tenaciously adhered to, makes the life of a people narrow and provincial.

Aims in education originated as man realized the necessity for making adjustments and adaptations in relation to his environment. Every age has had its dominant aim or aims. Every great nation has at some time formulated its aims for gaining and maintaining its "Place in the sun"; and directly or indirectly, these aims have affected its educational

policies. Attention has already been called to certain aims that reflected educational needs and practices at different periods of civilization.

Education has been described as a many-sided process and as such, a variety of aims has been formulated, each tending to emphasize some particular aspect of education. For example, if education as a transmission of culture were to dominate educational thinking, culture might easily become the supreme aim for the time being. If education as a formative process were dominant, discipline might become the principal aim. If a great crisis occurred in which the unifying forces of society were breaking, and if education as social control were seized upon as a corrective influence, social efficiency would serve as the chief aim. During an industrial crisis, such as the Industrial Revolution, a nation might easily lose sight of relative values and place undue emphasis upon utility as an aim. At the present time there is much discussion of the decline of the influence of the church in American life, and as a result the moral aim is receiving increased emphasis. The danger in setting up any one dominating aim is that education may lose its proper balance and become formalized in one particular direction. There is great need, therefore, for sound thinking among professional optometrists in order that proper balance in educational aims and policies may be maintained.

Aims in education change with changes in social and economic life and changing needs that follow, but the curriculum changes less readily. As a result, our present optometric curriculum contains many elements that lack satisfactory justification. The reason is not far to seek inasmuch as the school functions as a vehicle for the transmission of the accumulated experience of the race. Moreover, knowledge has, until very recently, accumulated very slowly through long stages of slow testing by experience. A fact once known, no matter how insignificant, became a part of man's priceless heritage and was valued according to the energy spent in gaining it rather than according to its immediate usefulness.

Optometry of the twentieth century owes a debt to the educators of other times that can never be fully repaid. The tradition which we have inherited was the result of their struggle through the years, while step by step we have arisen above our environment to control it for the satisfaction of our own desires. A powerful element in this improving process is man's ability to learn—to guide his actions by personal and past experience. Education is optometry's only hope for progress, and the only means by which each succeeding generation may transmit to the next a better and fuller profession than it received.

Without claiming any gift of prophecy I should like to point out that we are in a period of profound social and economic change—a climacteric of our western civilization. The war did not create our problems, but it has intensified them, so that the pattern of the postwar world is likely to differ greatly from that which we were familiar before 1939.

Shall I mention a few of the changes? A declining birth rate, together with the casualties of two wars, has materially changed the age-distribution of our population. A smaller group of young people must do the world's work, and support the aged. Increasing governmental control over economic life has resulted from the needs of war and the fear of want—so that the tasks of public administration will be more complex in the future, while the universal demand for some form of social security will increase the scope of governmental activity still further. Improvements in transportation have widened the scope of economic activity, making administrative decisions more difficult and increasing the importance of sound judgment based on accurate information, while improvements in production techniques have greatly increased the national income at our disposal.

These developments, and others too numerous to mention, affect the psychology of men and women, as well as the pattern of society. We shall need a restatement of philosophy to solve the paradoxes that now confront us, and a new attitude of mind to attain the freedoms of the Atlantic Charter. How can human progress be reconciled with the conservative insistence on security for all? How can adequate investment be attained in the face of present levels of taxation and public extravagance? How can personal happiness and mental independence be engendered in the mind of a semi-automatic machine? How can we ensure the tremendous production of goods and services, as well as the effective distribution, that is necessary for the attainment of a decent standard of living throughout the world?

If our colleges and universities are to be worthy of their traditions, they must contribute effectively to the solution of these problems—the urgent need for training that will enable the student to make the largest possible contribution to the productive process. I have already said that a smaller number of young men and women must produce a larger quantity of goods, so that the need for a high level of scientific skill and economic judgment is apparent.

This insistence on the need for better training of those who will be called upon in the professions to do the world's work, may seem to raise

the old arguments regarding the relative importance of professional and cultural education. In a sense they do, but to my way of thinking this argument has long been out of date and we must find a solution for the problem in effective synthesis. Properly conceived, no education is truly professional which does not train the mind of the student in such a way that he can formulate, against the background of our cultural inheritance, accurate judgments regarding the economic and political problems of the society in which he lives; nor is any education truly cultural which does not help the student in the task of adjusting himself to "earning" and "voting" environment with which modern society surrounds him. Both professional training and cultural learning constitute a preparation for mature life and the attempt to segregate one from the other can only end in the impoverishment of both.

Having said that, and placed upon it all the emphasis that I can command, I do, however, want to suggest that in my opinion the curricula of our colleges and universities must, in future, be such that no man or woman can complete a course without attaining in the process specific competence for the task of earning his or her living during the years that must follow graduation. This does not mean a narrowly specialized course, since such things as the knowledge of history and the power to express oneself effectively in the English language are just as essential for the optometrist as they are for the novelist; indeed, some modern fiction suggests that clear and accurate expression must be of more importance to the optometrist. What is demanded by the modern world is an integrated course of professional and cultural content which will enable the man or woman who graduates to enter directly upon a career of practical usefulness—an ideal that has not always been attained during the past quarter of a century.

Optometric education must be living and dynamic. It changes and there are always differences of opinion as to what should be changed, and what retained. But one thing I am certain that we all can agree on that it must be of the highest quality and follow the progress made by the older professions. The period of the private professional schools, with their tremendous handicaps and struggles is drawing to a close. As I have said before, these schools have made unusual contributions in the growth of our profession, and for this I am certain we all honor them. The writer believes our hope now lies in impressing our universities, especially the ones with established medical courses of the great need for optometric education, and interest them in incorporating our present

private schools into their organizations, and along with other new ones to establish a group of modern optometric schools.

In closing I would like to suggest the following as the very, very minimum for a course of study in optometry: the professional program should include adequate instruction, theoretical, laboratory and clinical in the fundamental, biological, physical and psychological sciences and in the professional subjects of each of the following groups: (1) Refraction, muscular and innervational anomolies and all subjects and practices germane thereto. (2) General and ocular pathology. (3) Ophthalmic mechanics. (4) Optometric ethics, economics and jurisprudence.

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CORRESPONDENCE

COMMENTS ON ANISEIKONIC CASE REPORT BY MORGAN*

To the Editor:

Dr. Morgan† is to be complimented on bringing to the attention of the profession the history of an unusual case in which almost every anomaly encountered in one's refractive practice is to be found.

While the average eye specialist sees many patients who have an anisometropia of four diopters, the majority of those seen in a routine practice have isometropia or an anisometropia of less than two diopters. The majority of these can usually be given ordinary refractive corrections with assurance that the patient will be satisfied. The correction of an anisometropia of more than one or two diopters, however, may cause considerable discomfort which can only be overcome by aniseikonic correction. The severity of the symptoms will depend upon the general constitution and tolerance of the patient.

The average aniseikonic correction of between 1% and 2% has been found to give relief. People who have no ocular symptoms are usually found to have image size differences of less than 1% and more often less than ½%. The largest image size differences found are in cases of monocular aphakia, where the images may differ in size as much as 30%. We have reported a few cases [1] in which the aniseikonia was 4% or more. In one case [2] we had the opportunity to study the change in aniseikonia over a number of years; a case in which a myopia in one eye increased from +0.50 to —4.50 diopters due to lenticular changes. In this case there was a change in the image size difference corresponding quite accurately with the change in the anisometropia.

Dr. Morgan's advise relative to monocular occlusion as a diagnostic

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† Merdith W. Morgan. An Unusual case of Aniseikonia. Amer. Jour. Optom. & Arch. Amer. Acad. Optom. 22, 2, 57-63. 1945.

[1] Bielschowsky, A.: Congenital and Acquired Deficiencies of Fusion. Am. J. Ophthal., 18 (10): 925-937 (October), 1935. Bannon, Robert E.: Heterophoria and Aniseikonia, Am. J. Optom., 16 (3): 96-109 (March), 1939. Bannon, Robert E: Practical Aspects of Aniseikonia, Am. J. Optom. and Arch. Am. Ac. Optom., 19 (6): 239-256 (June), 1942. Burian, Hermann M.: Clinical Significance of Aniseikonia. Arch. Ophthal., 29: 116-133 (January), 1943.

[2] Burian, Hermann M., and Kenneth N. Ogle: A Study of the Aniseikonia in a Case of Increasing Unilateral Index Myopia, Am. J. Ophthal., 26 (5): 480-490 (May), 1943.

means of determining the origin of the patient's symptoms should be used by refractionists more frequently. A paper [3] on this procedure appeared in this Journal in 1943. Since the origin of ocular symptoms is often difficult to discover, occluding one eye for several days may indicate whether or not it is due to some factor of binocular vision. If the patient is more comfortable using one eye rather than both, there can be no doubt that the difficulty lies either in a heterophoria or in an aniseikonia.

There is only one suggestion in Dr. Morgan's paper about which we would like to urge caution; namely, that an approximate method of correcting aniseikonia in cases of anisometropia, is to change the standard base curves of the lenses. In cases of anisometropia where both eyes are hyperopic increasing the base curve of the lens for the less hyperopic eye will result in an increase of magnification for that eye and will tend to reduce the difference between the two corrective lenses. Obviously, in cases of astigmatic anisometropia, simply changing the base curves will only result in meridional magnifications which may be more difficult for the patient to cope with.

In cases of anisometropia where one eye is myopic, altering the base curves may not give the desired magnification changes, and may actually increase the aniseikonic error, if the myopia is greater than 2 diopters, except if the thickness of the lens for the less myopic eye is excessively increased. In the case cited by Dr. Morgan, if the right lens (for the more myopic eye) be ground on the deepest curve possible (—16.00) with stock lenses and the left lens made on a flat base and the thicknesses are kept the same, a change of the difference in magnification between the lenses (compared to standard corrected lenses) would be —0.25%. Thus, actually the aniseikonic correction would be made slightly worse. When the refractive correction is in the neighborhood of —1.5 D., increasing the inside curve will give practically no increase in magnification. If the myopic correction is greater, increasing the inside curve and keeping thicknesses approximately the same, a minification will occur. The explanation of why increasing the flexure of minus lenses does not give increases in magnification is because with the eyewire distance kept fixed, the vertex of the lens moves away from the eye, causing a decrease in magnification. This decrease in magnification

[3] Bannon, Robert E.: Diagnostic and Therapeutic Use of Monocular Occlusion. Am. J. Optom. and Arch. Am. Ac. Optom., Vol. 20, No. 10 (Oct., 1943), pp. 345-357.

more than offsets the increase that results from increasing the flexure itself.

Dr. Morgan's paper should assist practitioners in understanding and solving the problems of anisometropia. It is hoped that our comments will caution the refractionist against haphazard prescribing of lenses for patients with anisometropia. Only by careful aniseikonic examination and the prescribing of correctly made aniseikonic spectacles can one be sure of what is being done.

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ON REPORTS OF COLORIMETRY COMMITTEE OF THE OPTICAL SOCIETY OF AMERICA

To the Editor:

I feel that I should like to have published in your journal a correction as to the authorship of the report of the Optical Society of America committee.[1] The first section which was published in the JOURNAL OF THE OPTICAL SOCIETY OF AMERICA, "The Historical Background and Evolution of the Colorimetry Report of the Optical Society of America," was written by me, as chairman of the committee, and published under my name as author. This I felt was desirable since in that section I was reporting to the Optical Society and the public in general as chairman of the committee and some of the statements which I made and very definitely wished to make might possibly not be supported unanimously by the committee.

The remaining sections which have been published, however, have received the approval of the whole committee and, in fact, large portions of some of these sections were written by other members of the committee. These sections should not be attributed to me personally as the author, and I would appreciate the publication in your journal of a corrective note pointing out that the authorship of all of the sections except the first is the OSA colorimetry committee, and not me individually.

LOYD A. JONES

[1] Portions of these reports appeared in several issues of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY during the year 1944.

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COMMISSIONS FOR OPTOMETRISTS REFRACTING IN THE U. S. ARMY

As these lines are written, the bill H. R. 1699, authorizing the commissioning of optometrists in the United States Army is still in committee and there has experienced some rather rough sledding. However, this was to be expected and as optometrists we must not permit these initial set-backs to cause us to lose heart. In every legislative battle to date, and optometry has had many of these, the path has been hard and the discouragements many. Yet in the face of these, optometrists have carried forward to ultimate success. In these previous engagements much

of vital importance to our profession was at issue. This is true again today, with the added incentive that army optometrists serving their country as military refractionists are urging us to justify their skill and training in the eyes of all men. In this task we cannot fail. Our fellow practitioners who have given up their homes and their practices to join the common cause feel keenly on this subject. A letter from one dated April 11, 1945, says:

> "Enclosed is a check for subscription to the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY. My mailing address you will find below.
>
> "Until recently your magazine was made available to me through another optometrist, Lt. (j.g.) who was aboard one of the ships that used our port. He has been transferred, and now I miss the articles and original papers, which I found very interesting. Your magazine has a personal interest to me, because a number of the associate editors and collaborators are personal friends and professional associates.
>
> "I am now located in the Aleutians, and am the Officer in Charge of an Optical Service Unit. We are attached to the EENT Clinic where I do all the refractions and assist in the ocular pathology cases. The doctor in charge of the EENT Clinic is an Ear, Nose and Throater, and does very little eye work. Most of it is left to me. Besides my duties in the Eye Clinic I supervise the operation of the Optical Unit. We have two other optometrists who are doing an excellent job. They are Pharmacists Mates and are doing the technical work of opticians.
>
> "Occasionally when the right ships are in port at the same time, we have a regular optometric round-up. There is another optometrist aboard a ship using this port, Lt. (j.g.) When these men are in port, I invite an army Sergeant, also an optometrist, stationed on this island, and we have a little discussion group. Some of our discussions are academic, some practical, and occasionally result in just a plain 'talk' session. These 'get-togethers' are good morale builders, and as I see it, some of our men really need it. The general opinion of these men, including myself, all from different states, (Pennsylvania, Massachusetts, Maryland, Iowa, Idaho, Wisconsin)

> is—the optometrists as a group back in the states have let down the optometrists in the service. We know there is a professional place for all of us, both in the army and the navy, but the optometrists back home didn't fight for us as we fought and some have died for them."

These fine young optometrists, and all others in our services, must be given the full and heartfelt support of those at home. The present bill should be pushed and supported to the fullest extent, and if this is not the proper bill, then it should be re-draughted and re-filed. The fight must be carried forward to its only proper conclusion—a commission for every army optometrist who is engaged in ocular refracting.

CAREL C. KOCH.

THE NEW QUARTERLY REVIEW OF OPHTHALMOLOGY

The QUARTERLY REVIEW OF OPHTHALMOLOGY will be issued during the Spring of 1945, under the supervision of Dr. Conrad Berens and a staff of ophthalmologists. The material in each issue will be classified and presented according to the plan outlined below. Through this plan a continuous extension course in visual care is now available. This material will be compiled from all of the medical, ophthalmological and optometrical journals of the world and will be supplemented with important contributions from clinics, hospitals, associations and from special bulletins. This new work is being published by the Washington Institute of Medicine, 314 Randolph Place N. E., Washington, D. C.

Through the combined clinical and teaching experience of its Board of Editors the QUARTERLY REVIEW OF OPHTHALMOLOGY will provide interesting and helpful knowledge which optometrists may successfully apply in their own practices. This will be particularly true of the detailed descriptions of the new and improved techniques that are constantly being developed.

Because of its scope this new journal will contain a complete subject and author index in which it will take but a moment to locate the specific information desired. The annual subscription rate is $9. The American Academy of Optometry welcomes this new publication because it will further stimulate serious thinking on all matters of eye care and will also combine within one set of covers the foremost current contributions of both ophthalmologists and optometrists.

The QUARTERLY REVIEW OF OPHTHALMOLOGY is organized, edited and planned as a post-graduate journal in ophthalmology and optometry. It will provide for its readers an authoritative time saving plan for keeping abreast of advances as these are developed in these fields. It is being edited by recognized authorities and is therefore authoritative and will serve optometrists as a permanent reference work. The material in each issue will be classified as follows: (1) Optics and visual physiology. (2) Ocular movements. (3) Anomalies of refraction and accommodation. (4) Conjunctiva. (5) Cornea and sclera. (6) Anterior chamber and pupil. (7) Uveal tract. (8) Crystalline lens. (9) Vitreous humor. (10) Retina. (11) Optic nerve. (12) Visual tracts and centers. (13) Eyeball. (14) Glaucoma. (15) Lacrimal apparatus. (16) Eyelids. (17) Orbit. (18) Allergy. (19) Anesthesia. (20) Aviation and military ophthalmology. (21) Medical ophthalmology. (22) Pharmacology and therapeutics. (23) Comparative ophthalmology. (24) Hygiene, Prophylaxis and industrial ophthalmology. (25) Ophthalmic sociology. (26) Education, history and institutions. (27) Miscellaneous.

CAREL C. KOCH.

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

ACADEMY COMMITTEE APPOINTMENTS

Dr. J. Fred Andreae, President of the American Academy of Optometry, has appointed the following members of the Academy to the Advisory Board to serve for the year 1945: Dr. Arthur P. Wheelock, Chairman; Dr. Harry Fuog, Dr. Irvin Borish, Dr. Don R. Paine.

CUYAHOGA ACADEMY OF OPTOMETRY

We have been holding our regular monthly meetings on the second Monday of each month and the following is a resume of this year's meetings.

A Dinner meeting was held to welcome the six newly accepted members to the Academy. The speaker for that occasion was Dr. E. L. Higgens, who spoke on Bjerrum Screen Technique and Interpretations.

Dr. Joseph Nupuf was the next speaker and he gave a very interesting paper on Contact Lenses and demonstrated the taking of a cast of the eye.

Our next meeting was of unusual interest because of Dr. R. E. Bannon of Dartmouth who addressed us on Aniseikonia and also demonstrated his new instrument. The meeting set a precedent in that a number of our medical friends were guests and also a number said they were disappointed that they were unable to attend.

Our last meeting was devoted fully to the report of the Industrial Committee. We have been active in laying the foundation for an Industrial Panel under the sponsorship of the Cuyahoga Academy.

Our attendance has been quite gratifying with an average of 22 out of a possible 30, despite unusual weather.

We have investigated the possibility of affiliation or representation with related organizations. A. A. SCHMIDT.

NEWLY ELECTED FELLOWS OF THE ACADEMY

The following optometrists, research clinicians, educators and optical scientists have joined the Academy since the 1944 Annual Report of the Secretary was presented at Chicago, Ill., December 11, 1944:

Dr. Hugo Apel, 146½ N. Larchmont Blvd., Los Angeles, California.
Dr. N. A. Bixler, Decatur, Indiana.
Dr. J. J. Brady, Sheldon, Iowa.
Dr. Roy E. Denny, 704 Odd Fellow Bldg., Indianapolis, Indiana.
Dr. Robert F. Downs, 649 S. Olive St., Los Angeles, California.
Dr. W. D. Elson, 905 Odd Fellow Bldg., Indianapolis, Indiana.
Dr. Robert C. Graham, 30 El Dorado Ave., Arcadia, California.
Dr. Walter H. Johnson, 27 Lebanon St., Hanover, New Hampshire.
Dr. G. F. Kintner, 107 West Market St., Wabash, Indiana.
Dr. Kenneth Kintner, Mishawaka, Indiana.
Dr. G. R. Ledig, 240 Bankers Trust Bldg., Indianapolis, Indiana.
Dr. R. G. Ledig, 240 Bankers Trust Bldg., Indianapolis, Indiana.
Dr. G. H. McBurney, Pomona, California.
Dr. J. C. Maheu, 3098 Main St., Springfield, Massachusetts.
Dr. Roy Marks, Univis Lens Co., Dayton, Ohio.
Dr. E. E. Reese, 14 East College Ave., Westerville, Ohio.
Mr. John J. Rohrbach, 242 Andrew St., Rochester, New York.
Dr. K. S. Rowe, First Natl. Bank Bldg., Fostoria, Ohio.

Dr. L. W. Scown, 6253 Hollywood Blvd., Hollywood, California.
Dr. J. Robt. Shreve, 709 East 38th St., Indianapolis, Indiana.
Dr. W. T. Stevenson, 11131 So. Michigan Ave., Chicago, Illinois.
Dr. B. B. Sullivan, Union National Bank Bldg., Wichita, Kansas.
Mr. A. E. Turville, 108 Abington St., Northampton, England.
Dr. Turner O. Veith, 3448 Fish Ave., Bronx, New York.
Dr. Gordon L. Walls, Scientific Bureau, Bausch & Lomb Optical Co., Rochester, New York.
Dr. Rita Walsh, Dartmouth Eye Institute, Hanover, New Hampshire.
Dr. O. T. Weigmann, 649 So. Olive St., Los Angeles, California.
Dr. O. C. Wells, 103 North 5th St., Murray, Kentucky.
Dr. Joseph Wurtzel, 313 State St., Perth Amboy, New Jersey.

REPORT OF ACADEMY COMMITTEE ON MEMBERSHIP*

Wm. Greenspon, Chairman
J. A. Seifert and Glenn Winslow

In presenting a report on the activities of the Membership Committee, we should like to call attention to the fact that the range of activity of such a committee in an organization of this character is circumscribed by many restrictions: the policies of the Executive Council, the method of selection and qualification of candidates, the impropriety of conducting a vigorous membership campaign, and the restrictions on meetings due to the War, have all acted as deterrents to expansion. However, your Committee has felt that there were available many men of Academy calibre who have not been properly informed concerning the aims and purposes of the Academy and that the membership could and should be expanded to the mutual benefit of these individuals and the profession.

During the past year our President gave the "go ahead" signal and your Committee circularized the entire membership of the Academy, requesting each Fellow to propose at least three prospective candidates. The response to this request was most gratifying and a number of names were submitted. Each of these prospective candidates was sent a personal invitation to submit a formal application for admittance. They were also sent several complimentary issues of the Journal, together with

* Report presented to the American Academy of Optometry at Chicago, Illinois, December 10, 1944.

a manual and a copy of the Constitution and By-laws. Your Committee received acceptances from a majority of these proposees, and formal applications from a large number and is happy to report that together with the activities of your Committee on Local Chapters, the acquisition of 59 new members, who have met all the necessary requirements, and have been admitted to Fellowship. We have on file about thirty letters from prospects advising us that they are preparing the required case histories and other material preparatory to submitting formal application. These applications will go through the regular channels and the candidates will in due course become Fellows. Your Committee feels that this procedure has elicited a new interest in the Academy, and that this activity has been carried out with restraint and dignity, and respectfully recommends that its successors continue the active search for good talent, retaining at all times the highest standards of selection, to the end that the Academy will continue to be recognized as representative of the highest ideals of the profession.

REPORT OF MARCH MEETING OF LOS ANGELES CHAPTER

President Hutchinson called the meeting to order at 5:45 P. M. March 9, 1945. The minutes of the February meeting were read by the Secretary and approved. Dr. Fuog expressed his thanks for the recommendation of the Chapter that he be made a member of the Advisory Board. He stated that if he was appointed he would take an active part.

Recommendations for the following for Fellowship were made:
Robert C. Graham—by Fellow Ernest Hutchinson.
James L. Worden—by Fellow George H. McBurney.
Maurice M. Dalton—by Fellow Ed H. Morrissey.

As a precedent to all future balloting on recommendations, a secret ballot was taken with Fellows Goodman and Weigman acting as tellers. Graham and Worden were declared elected. The Dalton recommendation was laid over for consideration at our April meeting.

Chairman Hutchinson asked if the group would be interested in considering the development of a program or project for the betterment of Optometry professionally. Considerable interest was manifest and it was announced that an evening would soon be devoted to this subject. Fellows Goodman, Morrissey and Fuog were asked particularly to organize the evening and prepare papers on the subject. Dr. Fuog offered to develop a program and outline it.

Members present at this meeting were: Hutchinson, Hoare, Winslow, Kinney, Percival, Fuog, Apel, Wright, Morrissey, Scown, Weigman, Deacon, Salter, Goodman, McBurney and Dean.

After dinner we were treated to a paper by Edwin D. Fletcher, A.B., Examiner in Charge of Research in the Division of Drivers Licenses of the California Motor Vehicle Department. His topic: "A Survey of the Adequacy of Drivers License Vision Tests." Mr. Fletcher pointed to the fact that California is the only state in the union that has taken a vision test and made a record of the vision of each of its licensed drivers. He stressed the part adequate vision plays in safe driving and gave figures which told a remarkable story. Mr. Fletcher told us that Optometry has an opportunity of doing a great good by aiding in the movement to unify the examination requirements for drivers licenses in all the States.

After an expression of appreciation to our speaker, the meeting adjourned.

JOHN R. DEAN,
Secretary-Treasurer.

MINNESOTA CHAPTER OF AMERICAN ACADEMY OF OPTOMETRY

Minutes of meeting held April 8, 1945, 2:00 P. M., Curtis Hotel, Minneapolis, Minn. Members present:

Dr. Carel C. Koch, Minneapolis.
Dr. Rudolph Ehrenberg, Granite Falls.
Dr. E. H. Kiekenapp, Minneapolis.
Dr. Lorne E. Holmes, Minneapolis.
Dr. Merril Burnham, St. Paul.
Dr. Einar Markhus, Minneapolis.
Dr. H. B. Kollofski, St. Paul.
Dr. Don B. Arden, Montevideo.
Dr. Charles P. Nelson, Minneapolis.
Dr. E. W. Larson, Hibbing.
Dr. W. H. Nordin, Austin.
Dr. E. J. Cummins, Red Wing.
Dr. R. G. Engel, Little Falls.
Dr. A. A. Moran, St. Paul.
Dr. H. C. Sherratt, Minneapolis.
Dr. G. N. Getman, Luverne.
Dr. J. L. Kubicek, Waseca.

Dr. Carel C. Koch, Secretary of the American Academy of Optometry, opened the meeting and acted as Temporary Chairman. He stated briefly that he had been asked by the American Academy of Optometry to call the meeting for the purpose of discussing plans for reorganizing the Minnesota Chapter into an active group. Dr. Koch then read the names of members present who belonged to the American Academy of Optometry, and welcomed those who were not members. He then asked for suggestions on proper procedure of reorganization.

It was moved (1) by Dr. E. H. Kiekenapp that the inactive old

chapter be disbanded and cease to function. (2) That Dr. Rudolph Ehrenberg be made temporary chairman of a committee to reorganize the Minnesota Chapter, Dr. Ehrenberg to select his own committee. (3) That Dr. Ehrenberg and the committee draw up a new constitution and by-laws for a permanent organization of the Minnesota Chapter of the American Academy of Optometry, same to be presented at the next meeting for approval. Dr. Rudolph Ehrenberg appointed Dr. E. H. Kiekenapp, Dr. H. B. Kollofski, and Dr. Carel C. Koch to serve on this committee.

It was suggested to the committee that they write other local chapters for copies of their Constitution and by-laws to use as a model. A discussion of modern optometric education followed. Meeting adjourned at 5:05 P. M.

A. VIRGINIA FLATTEN,
Recording Secretary.

PROCEDURE AND INSTRUMENTATION

Rudolph H. Ehrenberg

A department wherein discussions will be carried on relative to the value of various experimental and clinical techniques as employed by practicing optometrists, and also in which the instruments used by optometrists in various phases of their work, will be subjected to some critical evaluation.

NEW STUDENT'S FUNDUS CHARTS

To assist teachers of ophthalmoscopy in professional schools and colleges, American Optical Company has published and distributed to such schools a new series of colored reproductions of normal and abnormal conditions to be found in the fundus oculi.

The fundus oculi charts were drawn by Brithke, a well-known anatomical artist, and the conditions shown are representative of those more commonly encountered. The charts are prepared in three forms. For lecture purposes in classrooms, they are bound in easel style and are so arranged that at all times a chart of the normal fundus is on view and can be compared with those showing pathological conditions as the latter charts are turned over.

The same charts are also printed individually so that they can be hung on clinic walls for quick reference. Overall dimensions are 19x22

inches, a size that makes the charts and explanations easily visible at some distance. Twelve charts comprise the series and each drawing is 15 inches in diameter, the largest ever published.

The third form is a 27-page 6x9 booklet for student use and reference. This booklet contains the same twelve charts plus two additional charts illustrating rarer eye conditions. This booklet is intended for use as a text-book in following lectures based on the enlarged form designed for classrooms and clinics.

Printed by a new four-color process, the charts are faithfully reproduced and represent the latest findings in the specific conditions illustrated.

The student will recognize from the charts and booklet a new aid in the study of ocular pathology, and it seems to the writer that the spirit of this contribution by the American Optical Company merits the approval and thanks of both the students and the members of the optometric profession.

PLASTICS IN ARTIFICIAL EYES

In a statement of distinct importance to the ophthalmic professions, American Optical Company announces it is now engaged in the manufacture of a new artificial eye made entirely of plastic materials.

This expansion, the officials state, is in line with the concern's objective of providing an ever-broader, more comprehensive service to the optometric and ophthalmological professions.

The new enterprise is founded on developments made in the field of artificial eyes by ocularist Fritz Jardon, Dr. Richard I. Jackson, chemist, Dr. Reuel Bennett, research photographer, and Conrad Noelle, plastics expert. These men are now associated with the American Optical Company in its new plastic eye division.

The new artificial eye is unique for two reasons. First, it is made entirely of non-irritating plastic materials and second, its iris is realistically implanted by a photographic reproduction. Both of these enable a fitter to provide the patient an eye that is durable, correctly fitted, and identical in color to the good eye.

The plastic composition of the new eye offers protection against its chipping, shattering, or exploding when subjected to sudden temperature changes. Accordingly, the new eye will be serviceable for longer periods of time. A patient requiring an artificial eye may choose be-

tween a stock eye or one made to order. Permanent molds for different eye sizes will provide the stock eyes.

Up to this time the United States has had to rely almost entirely upon foreign sources for its glass eyes. The new type eye has not only outmoded the old, but may free the United States from foreign dominance and dependence in this field.

It is pointed out, however, because production plans cannot be in full operation for some months, and because military requirements are expected to be heavy, the supply of new American Optical Company's plastic eyes for civilians will be limited for some time to come. Further announcements will be made as the new plastic eye division of American Optical Company expands its production.

BOOK NOTICES AND REVIEWS

Books received are acknowledged by notices in this department. Special selections will be made for more extensive review in the interest of our readers as space permits.

CLINICAL SCOTOMETRY. John N. Evans, M.D., F.A.C.S. Published for Long Island College of Medicine by Yale University Press. Cloth. 1938. 266 pp. $4.

Dr. Evans has formulated a most interesting hypothesis concerning scotomata as found on the campimeter. He first gives a short but concise history of development of the mapping of the blind spot. There follows a most interesting series of chapters on the armamentarium having to do with the charting [on the campimeter] with the most exhaustive studies concerning illumination, fixation conditions, the influence of accommodation on fixation, the fixation movements on the eye, the object or stimuli, its direction and rate of movement, and its relation to the retinal function, and the technique of making the study of the visual field.

Evans believes in using the smallest stimuli possible for this study and is enabled thereby to make a very precisely exhaustive study of the extensions of scotomata from the blind spots of Mariotte, similar to those which we in regular practice call the Siedel sign. By means of the use of the small stimuli he can map the most minute deviations from the normal and finds that most of these aberrations follow a definite vessel tree pattern that resemble the bifurcations of the central retinal vessels.

The spaces between these bifurcations which are edematous will not allow the proper nerve impulse to be transmitted through the synapse, and results in a wedge-shaped scotoma. This scotoma and its study he has named "angioscotometry." He uses this angioscotometry in studies of various types of pathological and non-pathological conditions, such as cervical compressions, suspended expiration, psychological disturbances, menstruation, sinusitis, glaucoma, catharsis, the use of coffee and tobacco, and so on. Incidentally, on page 115 he makes a very definite statement that the tonometer is at best a very crude instrument, the final reading of which is after all a measure of ocular tone (the word "tone" is used in a broad sense and is meant to include not only the internal pressure of the eye itself, but the resiliency of the tissues, etc.) and not a measure of the intraocular tension.

His theory, or as he calls it, the "Hypothesis of Angioscotometry" as differentiated from the "Fiber-bundle Hypothesis" is based on the retinal perivascular lymph space surrounding each part of the neural chain, of rod or cone cell, bipolar cell, and ganglion cell. The cells of the retina and its processes are surrounded by a fluid space. Thus the synapse which regulates the force of transmitted nerve impulse is thereby surrounded by the lymph. The fluid spaces are built up into perineural spaces as the fibers of the cells form fiber-bundles. The perineural spaces empty for the most part into perineural vascular spaces which pass with the vessel through the optic nerve head into the body of the nerve.

J. McLeod in his "Physiology and Biochemistry in Modern Medicine," says that "Edema in the pathological sense of the word is the product of a very complex series of events, the main features in its mechanism are: 1. Diffusion pressure. 2. Capillary blood pressure. 3. Osmotic pressure of blood proteins. 4. Difference of electric potential. 5. Variations in the permeability of the membranes concerned." Barlow states that "Edema is mainly due to two factors: 1. The starvation of the tissues by the loss of the nutrient blood supply, and 2. Accumulation of waste products of their own metabolism. . . . The amount of lymph which escapes from the vessels is determined by the needs of the tissue rather than by the condition of the vessels." When looked upon in this way the increase of tissue fluid in pathological conditions is simply an exaggeration of the physiologic. Thus it can readily be seen that anything which affects the blood stream will thus affect the lymph supply and thereby effectively block the transmission of the nerve impulse through the synapse, whereas in the fiber-bundle hypothesis, we must

presume that the transmission of neural impulse is broken in the nerve fiber itself.

This reviewer has found that the charting of the visual field on the campimeter with ½° stimuli of white, blue, red, and green should result in a field covering at least entire campimeter chart on the American Optical Company Brombach perimeter which extends vertically 20°, and horizontally 25° in each direction from the fixation point.

A thorough study of this book enables us to understand the reasons causing Siedel signs and their extension and enlargements. As far as this reviewer can see, there is a very definite correlation between the angioscotometry as measured with very minute stimuli and ½° color stimuli, although with the one the observer will obtain a vessel tree formation, with wedge-shaped scotomata, and with the other wedge-shaped scotomata for color.

Evans says nothing about the willed blocking of the sensory areas by the brain in accordance with the Brombach theory, but after reading this book we can see why the color fields as charted on the perimeter show up in the characteristic manner that they do using the technique of Brombach.

S. HERMAN SHURIN.

IMPORTANCE OF VISUAL CARE—NOW AND IN THE POST WAR PERIOD. Published by the Public Health Bureau of the American Optometric Association, 707 Jenkins Bldg., Pittsburgh, Pa. 72 pages, paper covers. 35c. 1945.

The 72-page, paper-bound report of the proceedings of the One Day Institute of New York entitled "The Importance of Visual Care —Now and in the Post War Period," is an important contribution to the literature on optometry's place in the post war world. The publication was made possible by the cooperation of the New York State Optometric Association and the Public Health Bureau of the American Optometric Association.

The report contains: A foreword by Dr. Elias J. Margaretten, Chairman, Public Health Bureau of the New York State Optometric Association; THE IMPORTANCE OF VISUAL CARE NOW AND IN THE POST WAR PERIOD by Dr. Norman B. Hays, President of the New York State Optometric Association; HOW LIGHTING EQUIPMENT CAN FURTHER EYE CONSERVATION by George J. Taylor, Supervisory Engineer, Lamp Department of the General Electric Company; THE U. S. ARMED

FORCES AND EYE CARE by M. Martyn Kafka, M.D., who is consultant flight surgeon of the United Air Lines. Dr. Richard Feinberg, Chairman of the New York State Optometric Association Industrial Vision Committee talked on PLANNING SAFE AND EFFICIENT SEEING IN INDUSTRY and Charles P. Tolman, Consulting Engineer for the National Society for the Prevention of Blindness talked on the CONSERVATION AND UTILIZATION OF VISION IN INDUSTRY.

The Honorable Alben William Barkley, Majority Leader of the United States Senate, gave the keynote address, THE GOVERNMENT'S PART IN EYE CONSERVATION. Other papers were: EYE CARE AND REHABILITATION by Ann Lehman, Senior Employment Consultant for the Handicapped, United States Employment Service of the War Manpower Commission; OPTOMETRY'S OPPORTUNITIES—NOW AND IN THE POST WAR PERIOD by Dr. Irwin A. Conroe, Assistant Commissioner in the State Education Department; THE CONSERVATION OF VISION PROGRAM IN THE SCHOOLS OF NEW YORK STATE by Emily A. Pratt, M.D., Supervisor of Eyes and Ears Bureau, State Education Department, Albany, New York.

The reading problem was discussed: THE PLACE OF THE READING CLINIC IN THE POST WAR PERIOD by Stella S. Center, Director of the Reading Clinic, New York University; LITTLE BITS LEARN TO READ by Frederick J. Moffitt, Acting Director, Elementary Education Division, The State Education Department; and EDUCATING OUR EYES by Dr. Clifford L. Treleaven, Professor of Optometry, Columbia University. EYE SERVICE FOR 100 MILLION AMERICANS by Dr. Harold Aaron, Medical Director of the Consumers Union, was the closing address and the report is concluded with a summary by Dr. Margaretten.

ANNOUNCEMENTS

LIONEL TOPAZ MEMORIAL LIBRARY OF VISUAL SCIENCE

The Committee for the Lionel Topaz Memorial Library of Visual Science at the Ohio State University announces the receipt of a donation of $250.00 from the Soft-Lite Lens Company.

This money has been added to the permanent endowment of the library in accordance with the request of the donor. The income from

this endowment will be used for the purchase of new books and subscriptions to periodicals related to visual science.

H. W. HOFSTETTER,
Chairman, Topaz Library Committee.

READING CLINIC—VISUAL SCIENCE COURSES 1945

Three courses in visual science have been planned for 1945, at the Reading Clinic, School of Education, The Pennsylvania State College. Since enrollment will be limited, advance registration should be made. Courses will be offered in the following sequence:

Ed. 425—*Scientific Direction of Learning Activities*, June 25 to June 29, inclusive. 1 credit. E. A. Betts, C. M. Welch, et al. Course fee: $6.00. This one-week short course deals with classroom reading problems. Special attention is given to visual readiness for reading.

Psy. 473—*Psycho-physiology of Vision*, July 2-Aug. 10. 2-3 credits. E. A. Betts and S. D. Melville. (The student may carry one other course in addition to this laboratory course.) Course fee: $12.00 or $18.00; Laboratory Fee: $2.00. This is a laboratory course dealing with visual screening techniques and the basic assumptions regarding vision in schools and industry.

Psy. 480—*Visual Fields*, August 13 to 18, inclusive. 1 credit. Dr. Marian Stoll. Course fee: $6.00; Laboratory fee: $5.00. This is a laboratory course for vision specialists, school psychologists, and technicians.

Psy. 475—*Clinical Procedures in Visual Re-education*, October 15 to 20, inclusive. 1 credit. Dr. Frederick Brock. Course fee: $6.00; Laboratory fee: $10.00. This is a laboratory course dealing with analysis and correction of squint problems.

EMMETT A. BETTS
Research Professor and
Director of the Reading Clinic.

CONTACT LENS INSTRUCTION COURSE BY FEINBLOOM

In compliance with a large number of requests from optometrists, Dr. William Feinbloom is organizing a course in the fitting and prescribing of contact lenses. This instruction class will be held in his office at 138 East 36th Street, New York City, Monday, May 28, Tuesday, May 29 and Wednesday, May 30.

The latest developments in the fitting and prescribing of contact lenses will be presented at that time. The procedure is a strictly optometric one and the technique has been greatly simplified.

The instruction for the most part will be by demonstration and clinic practice to insure that each optometrist will individually go through the practical steps of fitting the plastic contact lenses. This course will

enable the optometrist to begin contact lens work in his own practice.

The class will extend for fifteen hours, as follows: Monday, May 28, from 10 A. M. to 1 P. M. and from 2 P. M. to 5 P. M.; Tuesday, May 29, 10 A. M. to 1 P. M., and from 2 P. M. to 5 P. M.; and on Wednesday, from 10 A. M. to 1 P. M. The group will be limited to insure personal instruction. The order in which registrations are received will determine the selection of the group.

MASSACHUSETTS BOARD OF REGISTRATION IN OPTOMETRY

The Massachusetts Board of Registration in Optometry will hold its next examination at the State House, Boston, Mass., June 11, 12, and 13, 1945.

Fee of $25.00 must be submitted with application and must be on file at the office of the Secretary, Room 413-N State House, Boston, Mass., at least two weeks prior to June 11.

Percival Gregory, O.D.
Secretary
BOARD OF REGISTRATION IN OPTOMETRY

A.O.A. BOOKLETS ON OPTOMETRIC EDUCATION

The Public Health Bureau of the American Optometric Association has been cooperating with three government agencies concerned with vocational guidance for servicemen. Two publications have already been completed.

One is a booklet, "Optometric Education," which has been prepared and printed for the United States Armed Forces Institute. Two thousand, five hundred copies of this booklet have been shipped to the USAFI for the use of individuals in the armed forces. "It is believed that the demand for information concerning the optometric profession is sufficient to justify the preparation of a brochure in this field," says Colonel Hansen of USAFI. The information included was written in a way that made it easily understandable and available to servicemen who are interested in optometry as a profession.

A copy of the booklet has also been sent to the Veterans Administration at Washington, D. C., so that they will know that material on the profession of optometry can be had from this office.

The second publication is an occupational brief for servicemen on the profession of optometry which was prepared in answer to a request from National Roster. This assignment from National Roster comes as a result of a request made to them by the Army Service Forces for booklets on various professional fields. These briefs will be sent to servicemen in reply to their inquiries for vocational information.

ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics.
12. Miscellaneous.

6. OCULAR AND GENERAL PATHOLOGY

NUTRITIONAL DEFECTS OF THE EYES. B. Rones. Sight-Saving Review. 1942, 12, 3, 178-181.

"Vitamin A has been frequently termed the ophthalmic vitamin, because of its great importance in the metabolism of the eye. This vitamin is widely distributed and is found in abundant quantities in such green vegetables as spinach, lettuce, cabbage, and sprouts; also in the yellow group of carrots, tomatoes and sweet potatoes. The vitamin is present in vegetables in the form of carotene, and is converted into vitamin A by the liver. Consequently animal livers are a rich source of vitamin A, particularly such products as codliver oil. Milk and dairy products are also rich in vitamin A. Deficiency of this vitamin causes changes in the epithelium and in the glandular structures derived from it. Thus in the eye a characteristic and conspicuous manifestation of its lack is a diffuse and mild xerosis of the conjunctival and corneal epithelium, associated with the reduced production of tears. The eyes and lid margins are reddened and inflamed, and are quite sensitive to light; this condition being persistent in spite of all local medication. It has also been stated that in the eye clinics dealing with children of the poorer classes, hypovitaminosis A is found in a considerable percentage

of the children with phlyctenular disease. Also vitamin A is a component of the visual purple of the retina, and is therefore intimately related to dark adaptation. This is of increasing importance in a world subjected to long night periods of black-out, and also to soldiers, sailors, and aviators who must engage in combat without the benefit of illumination. Although complete night-blindness is indicative of retinal disease, the mild forms of impaired dark adaptation can be greatly improved by augmenting the vitamin A intake.

"Vitamin B_1 is present in unpolished rice, yeast, etc. A deficiency of this vitamin is frequently found in chronic alcoholics, for such individuals possess stomachs whose mucous membranes have undergone atrophic changes as a result of their indulgences, and consequently their food absorption is altered. In such individuals the impaired function and resultant atrophy of the optic nerves, and also of the nerves of the oculomotor muscles, had previously been attributed to the toxic action of alcohol. It is now felt that these disturbances are due to the deficiency of B_1 and spectacular improvements have been reported where the vitamin has been given by injection, in some cases even where the use of the alcohol has continued.

"Vitamin B_2, or riboflavin, has recently been the cause of considerable investigation, for it has been stated that a deficiency of this vitamin is the most wide-spread of all vitamin deficiencies. In this condition there occurs an acne rosacea of the face associated with a chronic keratoconjunctivitis, in which the outstanding signs are the excessive superficial vascularization of the cornea, with infiltrates and ulcers. Improvement is dramatic after treatment with riboflavin.

"The function of vitamin C in ocular metabolism is unknown, although some investigators have attempted to relate it to the fragility of the retinal blood-vessels as a cause of hemorrhages in the retina.

'Vitamin D regulates the calcium metabolism and a deficiency of it may lead to cataracts of the zonular type.

"The importance of the general nutrition as related to the welfare of the eyes is an obvious one. The great problem is to detect the subclinical types of deficiencies in their earliest possible states, and supply the remedial agents. Most frequently a change and augmentation of the diet will be entirely sufficient, for the natural vitamins in food-stuffs are superior to those in capsule form. Certainly by such a simple preventive measure a great improvement in the ocular welfare of the nation can be expected." C. C. K.

EARLY DIAGNOSIS AND TREATMENT OF PRIMARY OPTIC ATROPHY. F. Cooper. Eye, Ear, Nose and Throat Monthly. 1944, 23, 2, 68-71.

The author claims there are 50,000 cases of primary optic atrophy in the United States today due to acquired syphilis. He points out that early diagnosis is not too difficult and is essential if any effective treatment is to save vision in these cases. He reviews the procedures necessary, these being the recording and interpretation of the visual fields, an ophthalmoscopic examination and a check of both the corrected and uncorrected visual acuity. C. C. K.

CERTAIN VIRUS DISEASES OF THE EYE. S. H. McKee, Canadian Medical Association Journal. March, 1944.

The properties of viruses are, that they are parasites unable to multiply apart from living cells; they are able to pass filters which retain all ordinary bacteria; and most of them produce inclusion bodies in susceptible cells. A number of the viruses are of ocular importance, and McKee discusses in detail the etiology and treatment of lesions of eye diseases caused by viruses, principally trachoma and kerato-conjunctivitis. T. O. B.

TOXICITIES. T. G. Atkinson. Optometric Weekly. 1943, 34, 44, 1263-1264.

"It is customary to classify toxicities as endogenous and exogenous. Endogenous toxines are those which are generated within the body, and include bacterial toxines, thyrotoxin, the ammonium bodies produced in nitrogen retention and kidney diseases, acetone bodies generated in diabetes, and the like. Exogenous toxines are those which are introduced into the body from without, including tobacco, alcohol, lead, coffee, morphine, quinine, and other similar poisons. Such a classification, however, has little or no clinical significance. A much better one is to place all bacterial toxines on one side and all non-bacterial poisons on the other.

"All toxicities, bacterial and non-bacterial, have certain common effects and symptoms. They all poison the neuro-muscular system and the sensory nerves and centers, so that they give rise to feelings of malaise, often headaches, perverted responses to stimuli, incoordination, and ineffi-

cient muscle performance. The cardinal difference between them is that bacterial toxines arouse certain biological defense reactions within the body, clinically indicated by a rise of temperature and an increase in the polynuclear white blood cells, while non-bacterial poisons are attended by no such defense reactions—the body has no biological defenses against them. However, it must be said that when bacterial toxicities have existed for a long period, the defense processes frequently, indeed usually, cease to operate, and there is no longer any fever or any leucocyte increase. On the contrary, in such cases there is often a shortage of leucocytes and an increase in lymphocytes, indicating a defect in glandular and nutritive functions.

"Undoubtedly the commonest form of bacterial toxicity encountered in ordinary practice is what is known as focal infection, i.e., absorption of toxines from some infected organ or area of the body, e.g., tonsils, teeth, gall-bladder, prostate, etc. And whenever, in examination of the visual mechanism, toxicity is demonstrated or suspected, a thorough search for such foci of infection is called for.

"Of non-bacterial poisons, the commonest are perhaps tobacco, coffee, and the ammonium bodies resulting from nitrogen retention or from nephritis. Lead and quinine poisoning are rare, and are usually easily demonstrated, both by symptoms and by history. Nitrogen retention and nephritis usually show up in a urinalysis.

"The prime—indeed, one might almost say, the only—method of demonstrating toxicity in an ocular examination is by means of visual field charting, especially the color fields. And here, we have an almost specific diagnostic gauge. It is safe to say that all toxicities contract the color field." T. O. B.

DIAGNOSIS OF GLAUCOMA. A. G. Thens. Minnesota Medicine. 1944, 27. January. 21.

According to Thens, glaucoma is the chief cause of blindness in the adult in the United States; and that this is chiefly because patients with glaucoma often do not come to the ophthalmologist for treatment before vision has been irretrievably damaged. The general practitioner may aid in early diagnosis of glaucoma if its early signs are recognized in "the general physical checkup," in examining persons for jobs for industry or applicants for insurance. Pain is not an early symptom of primary glaucoma, although there may be a sense of fullness in the eye especially after a heavy meal, after taking stimulants, or after viewing a

movie. Increased intraocular tension is the characteristic feature of glaucoma, and the size of the pupil is "a fairly good index" of the height of the tension, a wide pupil indicating high tension. The use of any drug that dilates the pupil, as belladonna or atropine, tends to increase the tension and may precipitate an attack of congestive glaucoma. Such drugs should not be used, therefore, in any case in which there is "the least suspicion" of glaucoma. While ophthalmologists use the tonometer for measuring intra-ocular tension, a fairly accurate estimate may be made by palpation, if this method is used repeatedly. An elongation of the normal blind spot is an important early sign of glaucoma; the defect is observed first in the nasal half of the field; the visual fields for colors, especially for blue, contract before the visual fields for form. The internist and the general practitioner can determine these visual field defects by the use of some form of tangent screen for charting the visual fields; this does not require any special training and may easily be made a part of the general physical examination. T. O. B.

DISEASES OF THE CONJUNCTIVA. H. G. Noyes. Optical Journal and Review of Optometry. 1943, 80, 1, 18-21.

The author reviews the newer methods of treating various forms of conjunctivitis, trachoma and pterygium. He stresses the need for early eye care. T. O. B.

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